

THE *ATRYPIDAE* OF NEW SOUTH WALES, WITH REFERENCES TO  
THOSE RECORDED FROM OTHER STATES OF AUSTRALIA.

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(With Plates xiv.-xvi.; Text-figures 1-5.)

One reason for the present paper is to make some additions to our present knowledge of the *Atrypidae* found in the Palaeozoic rocks of New South Wales, with a view to facilitate their correlation with those of similar age in other countries in which such rocks have been chronologically classified. The value of the *Atrypa* group for this purpose is hardly surpassed by any other group of brachiopods and because of this, and that a supply of good material has become available to work upon, the task of systematically dealing with members of the group represented in the Middle Palaeozoic rocks of this State is now undertaken. Besides the foregoing reasons, another inducement to deal with the group was the discovery, some time ago, of a number of remarkable brachiopods belonging to the *Atrypidae*, but not placeable in any of the existing genera of the family.

Up to the present the following species of *Atrypa* have been recorded from New South Wales,—*Atrypa reticularis* Linn., *A. desquamata* Sowerby, *A. plicatella* de Koninck, and *A. marginalis* Dalman. To these species we are able to add *Atrypa pulchra*, n.sp., *A. erectirostris*, n.sp., and *A. duntroonensis*, n.sp.

If the doubtful *A. plicatella* be omitted, New South Wales would be represented by six species of *Atrypa*, and this is quite a good contribution, for nowhere are the species of *Atrypa* found to be very numerous, as is the case with some other genera of brachiopods. In addition to these true *Atrypas* we find it necessary to add a new genus to the group, for the reception of some brachiopods collected from Molong, Yass and Bowning districts. From external features, these remarkable fossils were considered to belong to *Meristina*, but the discovery of specimens exhibiting internal structures proves that their true position is with the *Atrypidae*.

For this new genus we have decided upon the name *Atrypoides*, and in it we have placed the following species:—*Atrypoides australis*, n.sp., and *A. angusta*, n.sp.

*ATRYPA RETICULARIS* Linnaeus.

(Pl. xv., figs. 1-7; Pl. xvi., figs. 6, 19, 20.)

It is unnecessary to supply the synonymy or the description of this world widely distributed and stratigraphically persistent brachiopod. Its history for this State is a brief one.

The first record of its occurrence was made by the late J. W. Salter in a letter to the late Rev. W. B. Clarke, dated 28th Nov., 1858, wherein he states

that he had identified this species in a collection of fossils from New South Wales which had been sent to the Woodwardian Museum of Cambridge University by Clarke in 1844 for description.\*

In 1877 its presence is noted by Prof. de Koninck† from Kempsey, and the banks of the Murrumbidgee [Devonian]. With regard to the Kempsey locality there is considerable doubt, the formations in that area being of Upper Palaeozoic age. In 1888 the species was reported from the Bowning Beds.‡ In 1880 R. Etheridge, Jr., recorded *A. reticularis* from Bombala, and the variety *aspera* from Collins Flat.§

Normal specimens of this fossil from the Bowning-Yass Beds, exclusive of their foliated margins, appear to be rather smaller than the European species. The dimensions of one of the largest specimens from these beds are—length and width, 20 mm., depth 11 mm. Judging from the figures of *A. reticularis* in Davidson's British Brachiopoda, it would appear that adult British species usually exceed an inch in length and width, and are more gibbous than our forms. The pedicle valves of our specimens too seem less convex in the umbonal region, and more concave laterally and anteriorly. Some specimens from Wellington Caves, N.S.W., have been obtained of relatively large size, their length and width exceeding 43 mm. without the fringe, with a thickness of 26 mm. In these specimens the radial ribs are coarse, and the marginal sinus in front deep and tongue-like, but, except for their unusual size, their external and internal features, as far as they are revealed, are quite typical of the normal *A. reticularis*.

In the upper beds of the Bowning Series, a form occurs, possessing features which would place it about midway between *A. aspera* and *A. reticularis*, and although these features are unvarying in all the specimens of it that have come under our notice, we deem it undesirable to separate it from the type form at present. *Vide* Pl. xvi., fig. 13.

The stratigraphical range of the species in the Bowning Series extends practically from base to summit; but it is most abundant in the lower beds of the series especially in those of Hatton's Corner and the limestones of Limestone Creek, Silverdale. Its associates in these beds are *Barrandella linguifera* var. *wilkinsoni* Eth., *Rhizophyllum interpunctatum* de Koninck, *Encrinurus mitchelli* Foerste, *Bronteus jenkinsi* E. and M., etc.

*Loc. and horizon.*—Hatton's Corner, Yass River, Parish of Yass, County Murray; Limestone Creek Parish of Derrengullen, County King; Bowning Creek, etc., Parish of Bowning, County Harden. Upper Silurian—Wenlock or Barrande's étage E of Bohemia; and in the upper part of the Bowning Series probably passing into Devonian.

*ATRYPA ERECTIROSTRIS*, n.sp. (Pl. xv., figs. 10, 11; Pl. xvi., figs. 17, 18.)

Shell subdiscoidal when the fringe is attached in mature specimens; radial striae numerous, fine, strongly areuate laterally and dichotomous at more or less frequent intervals. Pedicle valve moderately convex at the umbonal region, concave laterally, and at front margin only mildly sinuate, umbo inconspicuous, beak erect, high, acutely-pointed, laterally supported by strong divergent umbonal ridges. Aperture circular, the under half enclosed by the deltidial plates, false area conspicuous, hinge line wide, undulating; cardinal angles high and rounded.

\*Sed. Form. N.S. Wales, 1878, p.155.

†Mem. Geol. Surv. N.S.W., Pal. No. 6, 1898, pp. 77-78.

‡Mitchell, Proc. Aust. Assoc. Adv. Sci., i., 1887 (1888), p.293.

§Jour. Proc. Roy. Soc. N.S.Wales, xiv., 1880, p.216.

Brachial valve very convex to gibbous in large specimens, laterally strongly turned up. The spiralia are of the true *Atrypa* type and, with cones, consist of ten or more spirals with their apices directed towards the outward centre of the brachial valve; apices of the cones are apart, but opposing sides compressed. *Dimensions:* The largest of specimens has a length and width of one and a-half inches without the marginal fringe, and a depth of three quarters of an inch. This specimen, with the fringe, would have had a width of not less than two and a quarter inches.

*Obs.*—The valves in young specimens are very mildly and about equally convex, and the umbo, cardinal ridges and beak form an isosceles triangle, the base of which is from one cardinal angle to the other, but with age the brachial valve becomes more and more convex until, when full growth has been reached, it is strongly so, or gibbous. This form resembles both *A. reticularis* and *A. desquamata*, but differs from each of them in the fineness of its surface ornamentation and the strong curve of the radial striae which is directed laterally. From *A. reticularis* it differs in the high, erect, pointed beak of the pedicle valve, the more exposed deltidium and false area, exceedingly fine concentric growth lines, and much greater dimensions when compared with normal representatives of the species. In the proportions of the length to width, and also in contour it agrees with *A. reticularis*. It resembles *A. desquamata* in having a high pedicle valve beak, exposed circular foramen and deltidial plates, prominent umbonal ridges and false area, also in the features of the brachial cones, but with some of these resemblances it is merely a matter of degree, because the beak of the present species is very much higher and erect, more acutely pointed and practically without incurvation. The umbonal ridges are less divergent, higher, and with the beak form a triangle with an acute apical angle, quite different from the triangle formed by these ridges in *A. desquamata*. Then there are the differences already referred to—the much finer superficial ornamentation of the shells of the local form, and the strong curving of the radial striae laterally and towards the cardinal angles. The hinge line of *A. desquamata* is mildly arcuate, that of the other undulating. Plainly our species resembles in several particulars both *A. reticularis* and *A. desquamata*, and the latter in more than it does the former.

Considering the tendency to variation among the *Atrypa* group some might be disposed to recognise *A. erectirostris* as a variant of *A. desquamata*, but it is to be noted that, though the differences between the two forms in some instances appear only to be of degree, yet they are permanently established; for, though the normal form of *A. desquamata* is found in association with the one here described, there is no evidence of gradation of the one form into the other, and this affords an additional reason for a separation of the two types.

*Loc. and horizon.*—Cave Flat, near the junction of the Goodradigbee with the Murrumbidgee River, an area that is now submerged by the waters impounded within the Barren Jack (Burrinjuck) dam, where it occurs plentifully in a stratum of limited thickness, associated with *Spirifer passensis* and many other *Spirifers* not yet determined, *Rhynchonella*, *Atrypa desquamata*, *Cyrtina*, etc. Parish of Woolgarlo, County of Harden. Probably lower Middle Devonian.

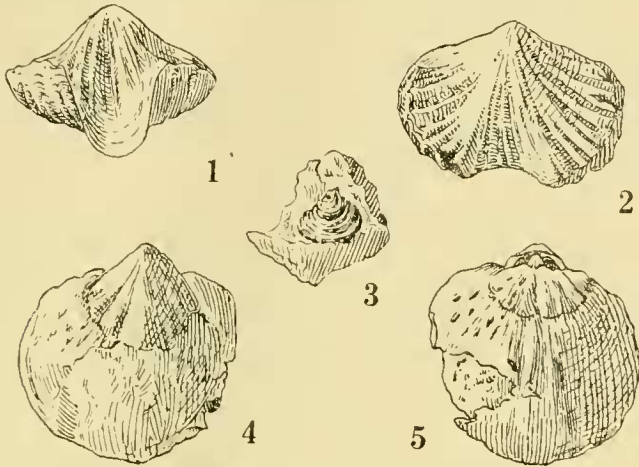
ATRYPA MARGINALIS Dalman. (Pl. xv., figs. 14-16; Pl. xvi., figs. 1-5; Text-figs. 1-5.)

The following is Davidson's description of this species\* :—

*"Spec. Char.* Transversely subpentagonal or almost elliptical; hinge line nearly straight; lateral margins rounded, very slightly so in front, beak of ventral

\*Mon. Brit. Dev. and Sil. Brachiopoda, vol. iii., Sect. Sil. Brach., pp.133-4.

valve small, straight, moderately incurved with a circular foramen under its extremity, and distinctly separated from the umbone or hinge-line of dorsal valve by a deltidium in two pieces, almost surrounding the aperture. Dorsal valve moderately convex and trilobed; mesial fold extremely narrow at first and suddenly widening, slightly elevated, flattened along the middle, and sharply separated from the lateral portions of the valve by a deepened groove. The fold is also often bent upwards close to the frontal edge. Ventral valve almost flat or very



Text-figs.1-5. *Artypa marginalis* Dalm. Enlarged drawings to show the surface ornamentation, muscular scars and, in one, greater portion of a spiral.

slightly convex near the beak, with a rather deep and sharply defined sinus, margined on either side by a prominent ridge, while the lateral portions of the valve are gently concave and vertically turned up at the extremity; lateral margins undulating; front margin abruptly raised, straight along the middle; surface of both valves ornamented with numerous small bifurcating ridges or ribs." The above description applies to the Australian representatives so fully as to make it unnecessary to give them a separate one.

In North America this species occurs associated with *A. reticularis* in Silurian rocks (Niagara Formation),† and is there said by the authors quoted to have been short lived, just as it appears to have been, as far as evidence yet available goes to show, in Australia.

The discovery of this very remarkable *Atrypa* in Australia is of considerable interest to paleontologists, adding, as it does, another instance of the remarkable powers for world wide distribution possessed by certain types of brachiopoda. It would appear too, that this species originated in the British Isles and lived there through a longer geological period than elsewhere. In this State it occurs plentifully in the lowest zone of the Lower Trilobite Beds of the Bowring Series on the East and West sides of the Bowring Syncline. Its vertical range here seems to be very limited. It is not improbable that it occurs also in the Orange district, for the fossil described by one of us‡ under the name of *Camarotechia*

\*Hall and Clarke, Pal. N.Y., vol. iii., Brachiopoda, pt. ii., p.173.

†Dun, Rec. Geol. Surv. N.S.W., viii., pt. 3, 1907, p.127, Pl. xl., figs.3, 3b.

*sussmilchi* may be identical with this species. In England it seems to range from Lower to middle Upper Silurian. In our Bowning rocks it is found associated with *Enerinurus silverdalensis* E. & M., *E. mitchelli* Foerste and below beds containing *Odontopleura bowningensis* E. & M., *O. parvissima*, E. & M., *Ceratocephala vogdesi* E. & M., and these rocks are not younger than those of Wenlock age. The occurrence of this small *Atrypa* at such a distance from places where previously found will no doubt be of much interest to geologists, and may help to indicate the route along which Palaeozoic marine faunas were distributed from Europe to Australia or *vice versa*.

The first record of its presence in Australian rocks appears to have been made by one of us.\*

*Loc. and horizon*.—Silverdale, Parish of Derrengullen, County King; and one mile south of Bowning Public School, Parish of Bowning, County Harden. Lower Trilobite Beds, Bowning Series.

ATRYPA PULCHRA, n.sp. (Pl. xiv., fig. 19; Pl. xvi., figs. 14-16.)

Shell subdiscoidal or rarely oval, biconvex, radial and concentric striae very fine, and form a beautiful cancellate pattern; marginal fringe very narrow, and mildly recurved, hinge line arcuate, front margin very mildly sinuate. Pedicle valve about as convex as the brachial valve, from the umbo for two thirds of its length medially decidedly ridged, and opposed to this in the brachial valve is a shallow sulcus; beak moderately prominent, mildly incurved, foramen conspicuous and circular. Brachial valve evenly and moderately to fairly strongly convex in adult specimens; sulcus faint and vanishes as it reaches the middle of the valve. *Dimensions* of an adult specimen—length and width, 15.4 mm., depth, 9.4 mm.

*Obs.*—This species differs from the *A. reticularis* in (1) its small size, (2) exceedingly fine ornamentation, (3) approximately equal biconvexity of the valves, (4) greater prominence of the beak of the pedicle valve and of its foramen, (5) its uniformly subcircular outline, (6) very narrow marginal fringe.

We have no specimen showing internal structure, but from external evidence we assume it to closely resemble that of *A. reticularis* in this particular. The specimens of this species used for the present description were obtained chiefly from the upper of the limestone beds of Limestone Creek, Silverdale, immediately below the Lower Trilobite Beds of the Bowning Series, and were associated with numerous corals representing the genera *Favosites*, *Heliolites*, *Cyathophyllum* and *Tryplasma* and with *A. reticularis*, etc. The vertical range of this fossil is apparently limited.

*Loc. and horizon*.—Limestone Creek, Silverdale, near Bowning, Parish of Derrengullen, County King. Probably Wenlock.

ATRYPA DUNTROONENSIS, n.sp. (Pl. xvi., figs. 8-12.)

Shell almost equally biconvex oval, radial ribs subsharply ridged, not prominent, dichotomise two or three times, concentric striae fine and very numerous and undulating towards the front. Pedicle valve moderately convex throughout, slightly upturned at the margins, umbo and beak not prominent, the latter depressed. Brachial valve slightly more tumid than the other, muscle scars inconspicuous, the margin in front very slightly sinuate. *Dimensions*: Length, 19.7, width, 17, depth 11 mm. These dimensions are for mature specimens.

\*Mitchell, Proc. Aust. Assocn. Adv. Sc., i., 1887 (1888), p.293.

*Obs.*—Among specimens forwarded by the late Rev. W. B. Clarke to the late Rev. Sedgwick in 1844\* from Duntroon, N.S.W., Salter reported having recognised *Atrypa reticularis* Linn. We are of the opinion that the shell now under review is specifically identical with the one referred to by Salter. It certainly bears some resemblance to the normal *A. reticularis*, and on first inspection we were inclined to make it a variety of the normal form but on closer study of it, determined to give it specific rank. From *A. reticularis* it differs in having the valves almost equally convex, little or no foliated margin, very fine wavy and numerous concentric striae, no defined sulcus in either valve, slightly sinuate margins, and the length invariably greater than the width. In some respects this species resembles *A. (?) headii* Billings var. *anglica*. Found associated with *Enerinurus duntroonensis* E. and M. and *Trinucleus clarkei* Mitchell.

*Loc. and horizon.*—Near Duntroon homestead, Parish of Canberra, County Murray.

ATRYPA DESQUAMATA Sowerby. (Pl. xv., figs. 12, 13.)

This species was recorded by de Koninck from New South Wales, but no particulars of locality were given.

Specimens of the species have been collected from the black cave limestone beds of Cave Flat, and Goodravale, Parish of Woolgarlo, County Harden, and the Tarago District, by officers of the Department of Mines, Sydney, and one of us, and it will be noticed, on reference to our figures given of a specimen of the local form, that it agrees with the European types.

ATRYPA PLICATELLA de Koninck.

This species was said to have been found in a black limestone in Yass district.†

No subsequent reference seems to have been made regarding the occurrence of this species in New South Wales rocks. Judging by the figures and description we are not disposed to accept de Koninck's determination. Externally it bears little if any resemblance to an *Atrypid*.

ATRYPOIDEA, n.g.

*Gen. chars.*—Shells strongly biconvex and at maturity some forms ovoid to globular, not conspicuously inequivalve, surface smooth, but sometimes very faintly showing concentric growth lines. Beaks not prominent, hinge line straight and moderately long; cardinal angles high and rounded. *Pedicle valve* less convex than the brachial, with or without a faint sulcus, beak of the pedicle valve relatively small, depressed and incurved. Foramen apical and circular in mature specimens. Anterior margin moderately to very intensely sinuate. The deltidial plates and teeth have not been observed. Muscle scars appear to be large and moderately defined. *Brachial valve* very convex, no defined median fold except in cases of mature specimens in which, towards the front, a short fold is sometimes developed, but sometimes bearing a very faint medial sulcus. No cardinal area, beak incurved and concealed. Crura unknown. Brachidia or spirals form cones, consisting of about ten volutions in specimens reaching two thirds maturity. The apices of the cones are directed towards the centre of the brachial valve cavity, but in one or two cases they had a droop anteriorly which may have arisen from accidental causes.

\**Op. cit.*

†de Koninck, Mem. Geol. Surv. N.S.W., Pal. No. 6, 1898, p. 78, Pl. iii., figs. 4 and 4a.

*Obs.*—The features which separate this genus from *Atrypa* are the great biconvexity and smoothness of the valves, absence of marginal fringe and radial striae or ribs.

*Genotype.* *Atrypoidea australis*.

ATRYPOIDEA AUSTRALIS n. gen. et sp. (Pl. xiv., figs. 1-18; Pl. xv., figs. 8, 9; Pl. xvi., figs. 7, 13.)

Shells intensely biconvex to subglobular in mature specimens. In young specimens mildly convex beak, as maturity is approached the convexity and front sinus of the valves rapidly develop, and at no stage of growth is the difference in the convexity of the two valves of this species very pronounced, though that of the brachial valve is the greater: cardinal angles rounded, hinge line wide, straight or only gently arcuate. Pedicle valve has, in some large specimens, a faint medial fold extending from the umbo to the front and, on each side of this fold, a very shallow faint sulcus; opposed to this in the brachial valve is a faint sulcus bounded by an exceedingly faintly defined fold, but this feature does not appear to be constant, for, in some forms, the plainness of the surface is uninterrupted and in others a feeble sulcus takes the place of the fold; front sinus wide and deep in mature specimens, its intensity gradually developing with age, very immature shells having none. Brachial valve very convex and at no stage of growth showing a decided fold, beak small and concealed. *Dimensions* of a mature individual (Pl. xiv., figs. 5 and 6): Length, 28, width, 28, thickness, 22 mm. The proportions of these measurements remain very constant for sizes of shells from half to full maturity.

*Obs.*—A specimen of this species was described by one of us\* under the name of *Meristina australis*. This determination and description was based upon superficial features only, which indeed very closely resembled those of the *Meristina* group. That there were good reasons for this determination is shown by the fact that specimens of this new group, showing only external features, were submitted to British palaeontologists and they referred them to *Meristina tumida*. More recently, specimens of the group with spirals preserved enable us now to place it in or near its proper phylogenetic position, and that it belongs to *Atrypidae*, we believe, cannot be disputed, though certainly a few features of its internal structure remain to be revealed, but we do not expect the revelation of them will materially alter the views we have arrived at with respect to its classification. Externally the group shows some features not seen in *Atrypa*, yet on the other hand has others that are truly Atrypoid, as, for instance, the straight hinge line, absence of cardinal area, high rounded cardinal angles, depressed incurved beak of the pedicle valve, and very strongly convex brachial valve. They are certainly extraordinary Atrypids and up to the present are known to occur only in the limestones of Molong and the impure limy shales of the Bowning Series, and the specimens in these different districts are, for the most part, alike specifically. Those belonging to the present species from Molong are uniformly of much larger size than the Bowning-Yass (Hatton's Corner) representatives. This variation may have arisen from more favourable conditions for their development having prevailed in the Molong area than at Bowning. In the former the sea was clear, and free from the muddy sediment present in the latter. Besides the relative smallness of the Hatton's Corner members of the species, they

\*Dun, Records Geol. Surv. N.S.W., vii., 1904, p. 318.

also appear to have a slightly less conspicuous umbo and beak than those from Molong; also the strong tongue-like anterior sinus would seem to have developed at an earlier stage of growth in those from Hatton's Corner than in the others. Further, in one specimen of this species from Molong, the brachidia show a rather strong droop apically, but this would appear to be accidental, for others from Molong show the apices of the spiralia to be directed almost towards the centre of the brachial valve, and this agrees with the Hatton's Corner types.

*Loc. and horizon.*—Near Molong, Parish of Bomey, County Wellington; Hatton's Corner, Parish of Yass, County Murray; Gurnett's Selection, three miles west of Bowning, Parish of Bowning, County Harden. Upper Silurian.

ATRYPOIDEA ANGUSTA, n.sp. (Pl. xiv., figs. 20-29.)

Shell intensely biconvex, subquadrate, smooth; length greater than width. valve margins intensely sinuate, front sinus very deep. Hinge line mildly arcuate; umbonal ridges low and spreading. Pedicle valve transversely and longitudinally strongly convex, just below the umbonal region the inflation is so great that it gives the shell quite a hutchback aspect; towards the front a very faint sulcus is developed, the sides of it being slightly more depressed than the medial portion, indenting lip tongue-like and long. Umbo of moderate size, beak strongly incurved and depressed, aperture small. Brachial valve very much arched transversely, highest in front of its centre, and developing into a strong fold on the anterior third. *Dimensions*: Length, 23.4, width, 22, thickness, 18.7 mm., for the largest specimens from Bowning and Molong; but the specimens from Hatton's Corner so far collected, are much smaller, the largest from here measuring—length, 19, width, 17.2, thickness, 14 mm., respectively, and an immature specimen from Molong had the same dimensions. The relative proportions of these measurements are fairly constant for the specimens from all three localities.

*Obs.*—The internal structure of the species has been observed in the Bowning form only and agrees in the spiralia with the genotype. From the foregoing species the present differs in being much more biconvex, having a less conspicuous umbo, more strongly incurved and depressed beak, narrower hinge line, greater length than width, a greater relative thickness, much stronger sinuosity of the lateral and front margins.

It may be noted that very immature shells of this species cannot be distinguished from similar ones of *A. australis*, or at least we have not been able to do so up to the present.

*Loc. and horizon.*—The same as for the preceding species.

*References to records of Atrypa from other States of Australia.*

QUEENSLAND.

*Atrypa reticularis* Linnaeus.—The occurrence of this species has been recorded from the Fanning River, Burdekin Downs, by the late R. Etheridge Jun.\* and by Foord.† In 1892, R. Etheridge repeated his previous records.‡

Through the courtesy of Mr. B. Dunstan, Chief Government Geologist of Queensland, we have been enabled to inspect the original specimen referred to

\*Proc. R. Phys. Soc. Edinb., v., 1880, p.270.

†Geol. Mag., vii., (3), 1890, p.100.

‡Geol. Pal. Qld. and N.Guinea, 1892, p.65, Pl. 4, f. 4.



this species by the late Mr. R. Etheridge, Jun., and after a very critical examination of it, conclude that it is not *A. reticularis*, but an immature *A. desquamata*. Our reasons for this conclusion are the prominent beak, the exposure in the specimen of an area, and the strong curvature of the lateral ribs towards the cardinal angles. In addition, the alleged *A. reticularis* is represented in the Museum of the Geological Survey, Brisbane, only by the single specimen which served Mr. Etheridge Jr. for his determination. This of itself is a very suggestive fact, for *A. reticularis* was a very gregarious brachiopod and wherever it occurs, does so, almost without exception, in numbers. It is also worthy of remark, that this fossil occurs in association with numerous individuals of *Atrypa desquamata*; a circumstance which supports the contention that it is an immature specimen of the latter species.

*Atrypa desquamata* J. de C. Sowerby.—The occurrence of this brachiopod is also recorded by Mr. Etheridge Jun.† It is found plentifully in the middle Devonian Rocks outcropping in the valley of the Fanning, Burdekin and Broken Rivers in the Burdekin Downs District, and the specimens collected from this locality agree very fully with the original types. In New South Wales, to my knowledge, *A. reticularis* has never been found in association with *A. desquamata*. May this not be the case also in Queensland? In England, the two species are found commingled in Middle Devonian Rocks.

#### VICTORIA.

F. Chapman\* has recorded the occurrence of *A. reticularis* var. *decurrens* from the Yeringian of Yering and Loyola; *A. aspera* Schloth. from Loyola and the Middle Devonian of Bindi; and *A. fimbriata* from Lilydale. The latter form he compared with *A. hystrix* and *A. spinosa* J. Hall from the Chemung and Hamilton Groups of N. America. In general these forms have extra-Australian Devonian affinities.

Mr. Chapman observes with reference to the occurrence of *A. reticularis* that he finds it to be very common in the limestone beds and much less common in the shales of the Yeringian beds of Victoria. In the Bowring-Yass beds of New South Wales, the same thing is noticeable, and it appears that this preference for clear sea floors on the part of this remarkable brachiopod is manifest in every part of the world where it is found. With reference to his *A. aspera*, recorded from the Yeringian beds and which he says had been recorded from the Silurian and Devonian of Victoria previously by McCoy, it must be observed that the latter regarded it as a variety of *A. reticularis*. We have some doubts as to the correctness of this determination, though it must be admitted that the concentric lamellae exhibited by Mr. Chapman's species closely resemble those of the original type. Whether Mr. Chapman's conclusion is right or not, it must not be overlooked that many palaeontologists recognise *A. aspera* only as a variety of *A. reticularis*.

*Atrypa reticularis* var. *decurrens*, to us, seems a slightly abnormal *A. reticularis*. Some similar specimens have been noticed by one of us from the Bowring Beds. *A. fimbriata* Chapman is a very interesting species and as Mr. Chapman points out is very like *A. hystrix* J. Hall. Nothing similar has yet been collected from New South Wales. Mr. Chapman† has also recorded *A. reticularis* from O'Keefe's Gully, Aberfeldy River, and *Atrypa* sp. from Tyler's River.

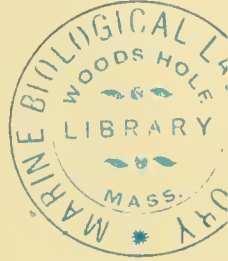
§*Loc. cit.*

\*Proc. Roy. Soc. Vict., xxvi., (N.S.), Pt. i., 1913, pp.107-109.

†Rec. Geol. Survey Vic., ii., Pt. i., 1907, pp.68, 71.

WESTERN AUSTRALIA.

A. H. Foord† records *Atrypa reticularis* from Mt. Piene, Kimberley District, associated with *Rhynchonella pleurodon* and *Rhynchonella cuboides*, in the Stromatoporoid horizon which Nicholson considered to be Upper Devonian. To our knowledge, no specimen of this species from a similar horizon in Eastern Australia has yet been collected.



EXPLANATION OF PLATES XIV.-XVI.

Plate xiv.

(All figures natural size.)

*Atrypa poidea australis*, Mitchell and Dun.

- Figs. 1 — 4. Ventral, profile and dorsal views of two perfect young specimens. Molong. Coll. Mitchell.  
 Figs. 5 — 7. Front, profile and ventral view of a mature specimen. Molong. Coll. Mitchell.  
 Fig. 8. Front view of a nearly mature specimen. Molong. Coll. Mitchell.  
 Figs. 9 — 11. Front, profile and ventral views of the largest specimen from Bowning. Coll. Mitchell.  
 Fig. 12. Ventral view of specimen shown in figure 8. Molong. Coll. Mitchell.  
 Figs. 13—18. Specimens from Hatton's Corner, Yass River. Fig. 13 shows the largest shell from that locality; fig. 18, a small, square-shouldered form with inconspicuous umbo. Coll. Mitchell.

*Atrypa pulchra* Mitchell and Dun.

- Fig. 19. A perfect specimen, dorsal aspect., Silverdale, near Bowning. Coll. Mitchell.

*Atrypa poidea angusta* Mitchell and Dun.

- Figs. 20—21. Oblique profile and front view of largest specimen from the Bowning series. This shows, in the original where the brachial valve is weathered slightly, faint outlines of one of the spirals. Gurnett's farm, three miles west of Bowning. Coll. Mitchell.  
 Figs. 22—26, 29. Specimens from Molong, at various stages of growth.  
 Figs. 27—28. Front and profile views of two specimens from Hatton's Corner, Yass River.

Plate xv.

*Atrypa reticularis* Linn.

- Fig. 1. A beautifully weathered transverse section of a large shell, showing the spiral cones and great inflation of the brachial valve. Wellington Caves. Coll. Mining Museum. Sydney.  
 Fig. 2. Same specimen as fig. 3, but enlarged to show the surface ornamentation.

†Geol. Mag., Dec. 3, vii., 1890, pp.100-1.

Figs. 3-4. Ventral and front views of normal specimen from the same locality and Collection.

Fig. 5. A very large specimen (silicified), showing, rather plainly, one spiral cone with some twenty coils and tongue-like sinuation in front. Reduced. Wellington. Coll. Mining Museum, Sydney, N.S.W.

Figs. 6-7. Ventral views of two adult shells. Derrengullen Creek, near its junction with Limestone Creek. Coll. Mitchell.

*Atrypoidea australis* Mitchell and Dun.

Figs. 8-9. Dorsal and ventral views, enlarged. Coll. Mining Museum Sydney.

*Atrypa erectirostris* Mitchell and Dun.

Figs. 10-11. Dorsal and ventral views of two specimens, slightly reduced. Cave Flat. Coll. Mitchell.

*Atrypa desquamata* Sowerby.

Figs. 12-13. Front and dorsal views of a specimen from Cave Flat, near the junction of the Goodradigbee and Murrumbidgee Rivers. Coll. Mining Museum, Sydney, N.S.W.

*Atrypa marginalis* Dalm.

Figs. 14-16. Ventral, dorsal and front views of three nearly adult specimens. Limestone Creek, Silverdale, near Bowning. Coll. Mitchell.

Plate xvi.

*Atrypa marginalis* Dalm.

Figs. 1-5. Photos of specimens of different stages of growth, slightly enlarged. Coll. Mitchell.

Fig. 6. A small specimen with concentric ornamentation, like *A. Aspera* Schloth. Coll. Mitchell.

*Atrypoidea australis* Mitchell and Dun.

Figs. 7 and 13. A sketch and photo. of a specimen from which the brachial is removed and the spiral cones exposed. Fig. 13 (enlarged 2).

*Atrypa duntroonensis* Mitchell and Dun.

Figs. 8-11. Four different specimens, dorsal and ventral views.

Fig. 12. Same specimen as Fig. 9, enlarged (x 2).

*Atrypa pulchra* Mitchell and Dun.

Fig. 14. Dorsal view, slightly enlarged.

Figs. 15 and 16. Ventral and dorsal views of mature specimens (x 2). Fig. 16 same as fig. 14. Limestone Creek. Coll. Mitchell.

*Atrypa erectirostris* Mitchell and Dun.

Fig. 17. A young specimen—shows the high, erect umbo, acutely pointed beak, steeply sloping umbonal ridges, and radial striae. (x 2.)

Fig. 18. An immature specimen in which the dorsal valve has been weathered away and exposed the spirals. The apex of the beak has been weathered off. (x 2.) Coll. Mitchell.

*Atrypa reticularis* Linn.

Figs. 19 and 20. Two specimens with the marginal fringes partly preserved.